

Roundabout Solutions for Safer Intersections



SAM RICHARDSON

REGIONAL INTERGOVERNMENTAL COUNCIL (RIC) METROPOLITAN PLANNING ORGANIZATION (MPO)

KENDRA SCHENK, PE, PTOE, RSP₂₁

BURGESS & NIPLE (B&N)



B&N

Agenda

1. Biographies
2. Context
3. Roundabout Myth Busters
4. Roundabouts in West Virginia
5. Overview of RIC Studies
6. Roundabout Funding
7. Next Steps
8. Questions





Biographies

Sam Richardson



Sam Richardson

- 5 years of transportation planning experience at RIC
- WV LTAP Roads Scholar II
- Specialties in geography, project development, and ADA planning



Kendra Schenk



Kendra Schenk, PE, PTOE, RSP₂₁

- 13 years dedicated to safety
- National safety expertise
- Project Manager for RIC Comprehensive Safety Action Plan and 10 Road Safety Assessments



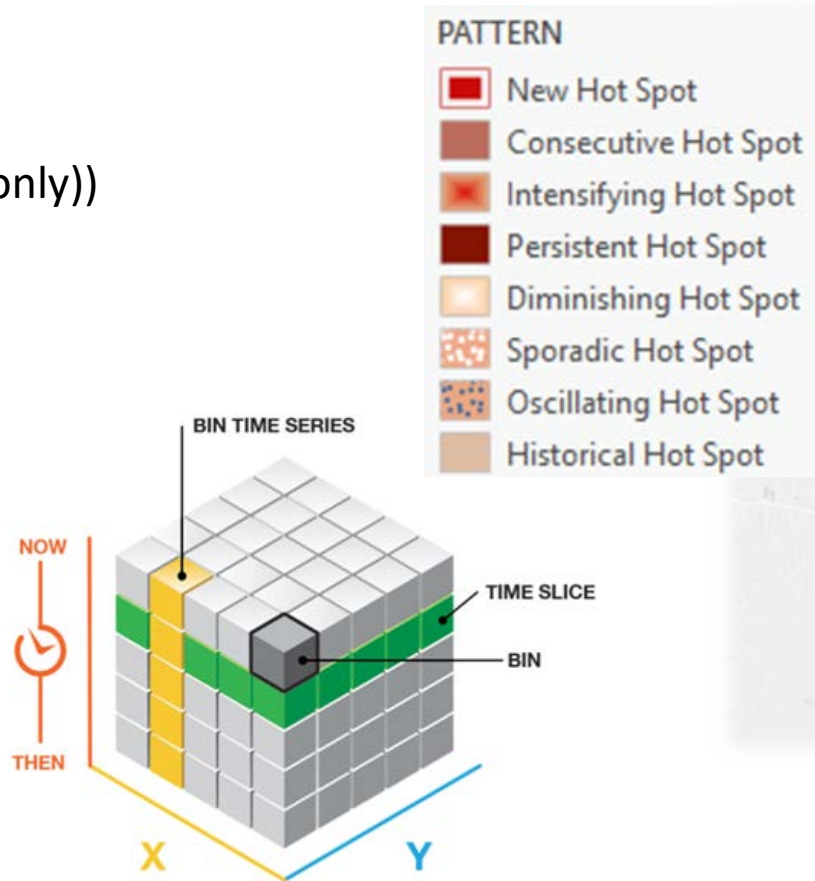


Context

Hotspot Identification: Pre-CSAP

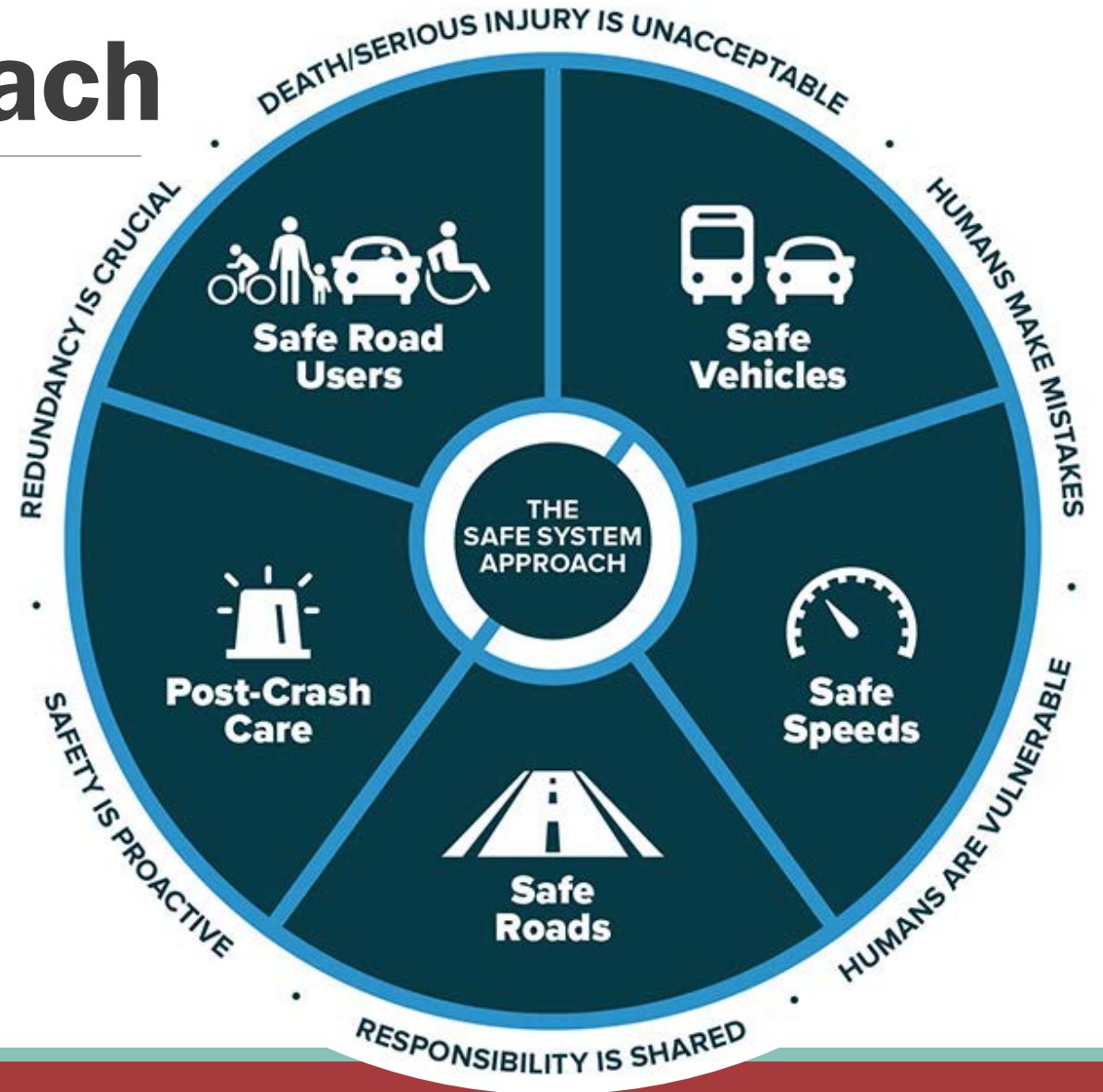
Weight=
(197.7nf(number of fatal)
*5.77ni(number of injury only))
+Nc(number of crashes)

Source: National Safety Council, 2015



Source: Esri, Emerging Hotspot Analysis, 2019

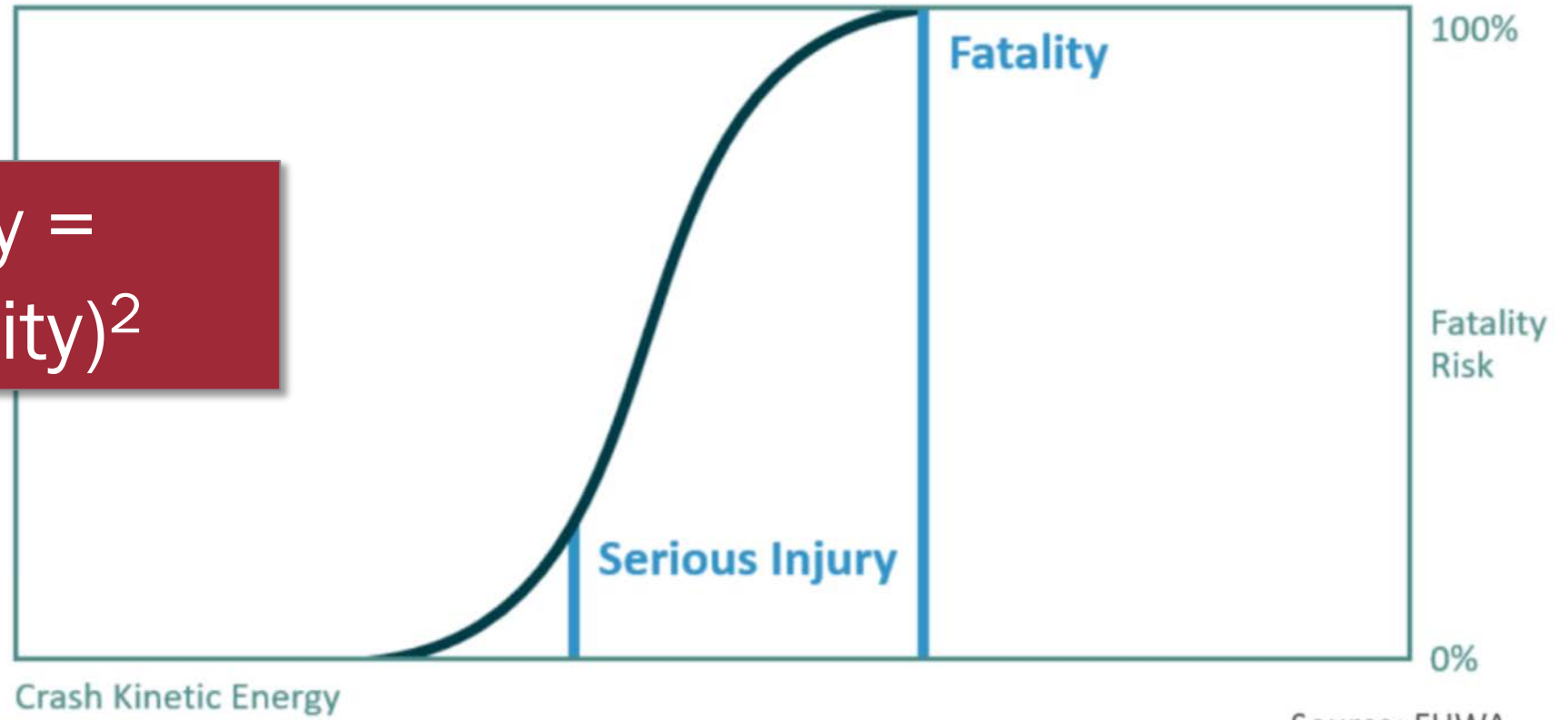
Safe System Approach



Source: FHWA

Safe System Approach

$$\text{Kinetic Energy} = \frac{1}{2}(\text{Mass})(\text{Velocity})^2$$

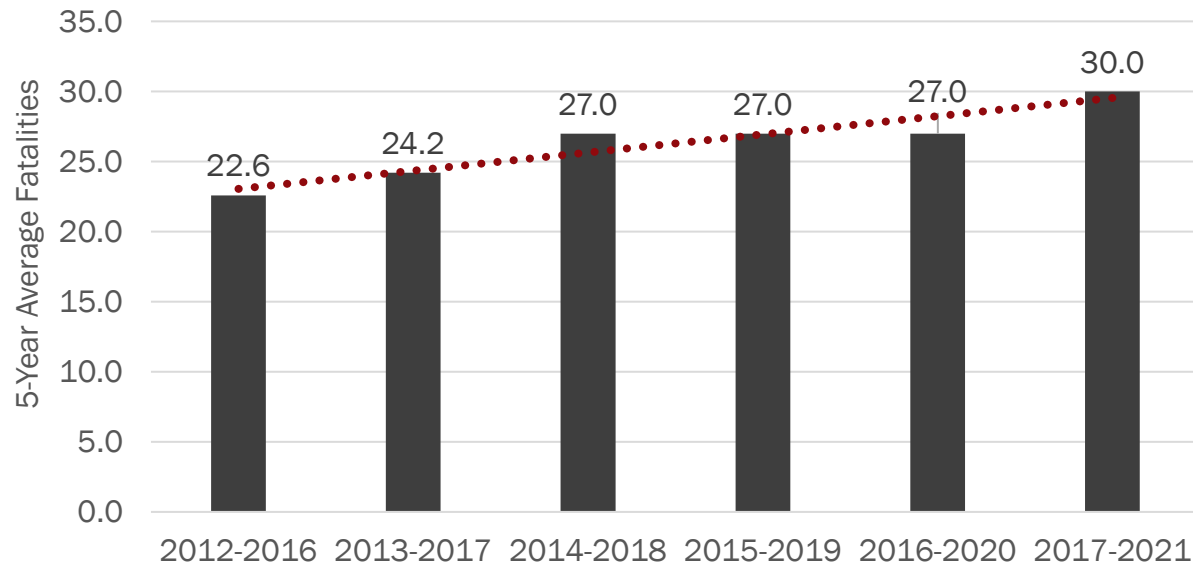


Source: FHWA

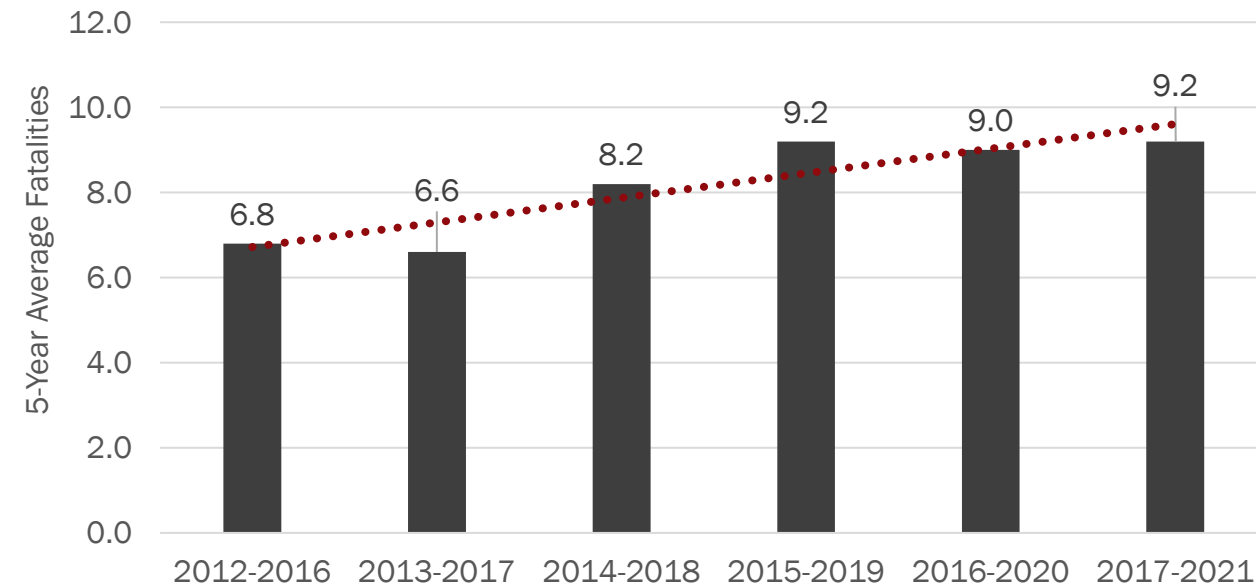


RIC Comprehensive Safety Action Plan (CSAP)

Fatalities in Kanawha County

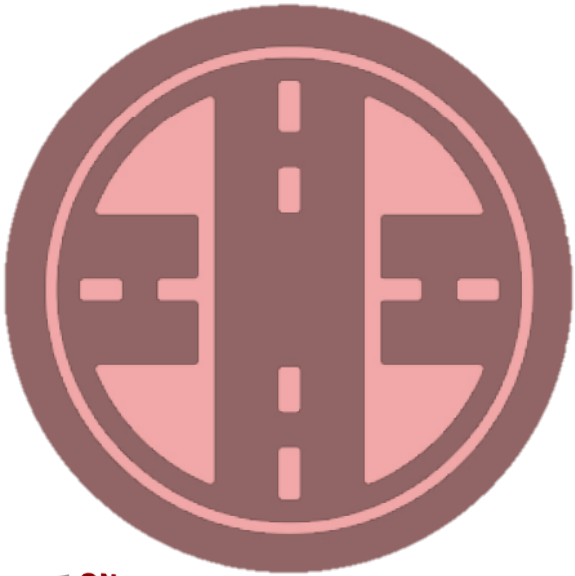


Fatalities in Putnam County



RIC Comprehensive Safety Action Plan (CSAP)

Intersections



Roadway Departure



Pedestrians



Speed and Aggressive Driving



Intersections as an Emphasis Area

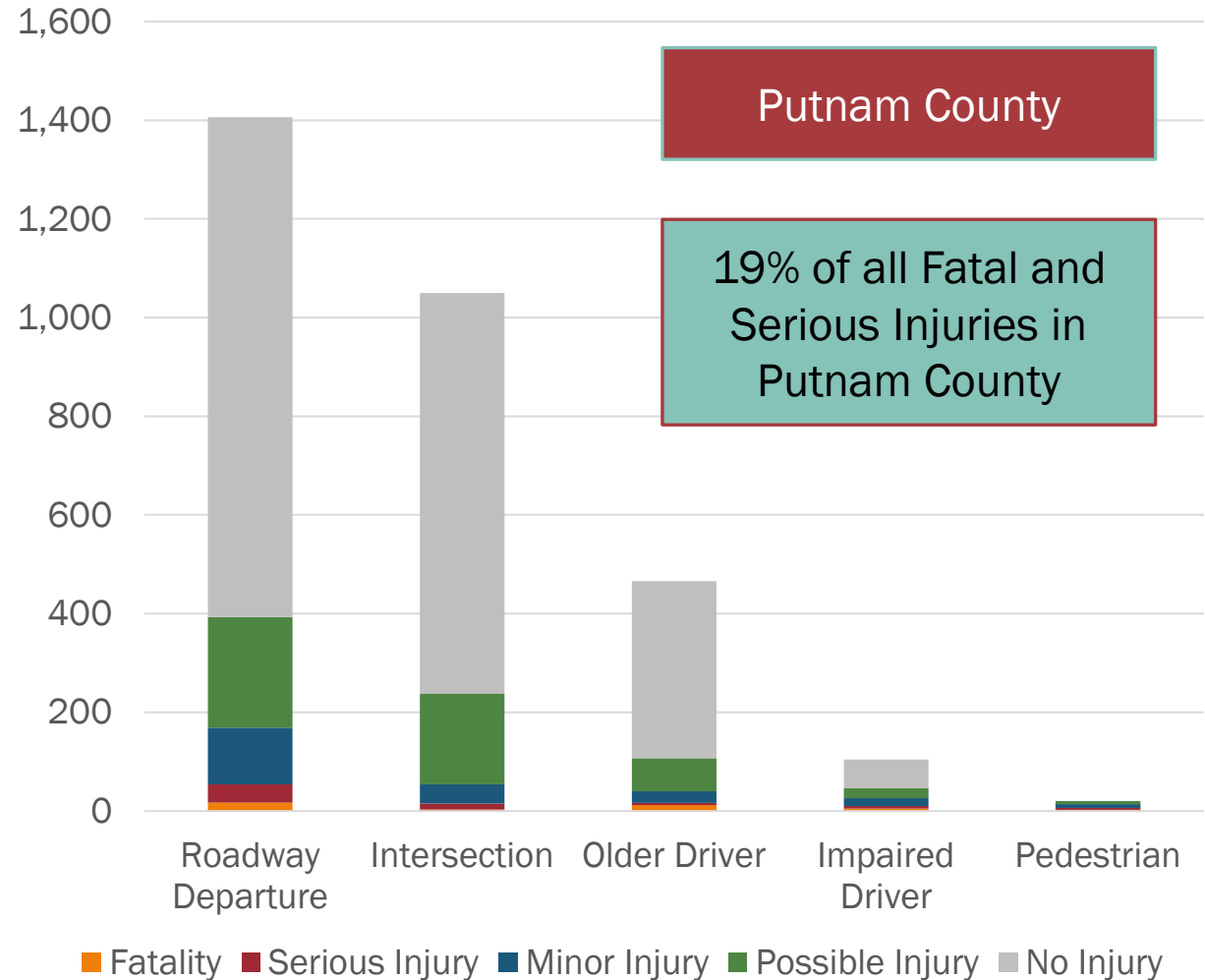
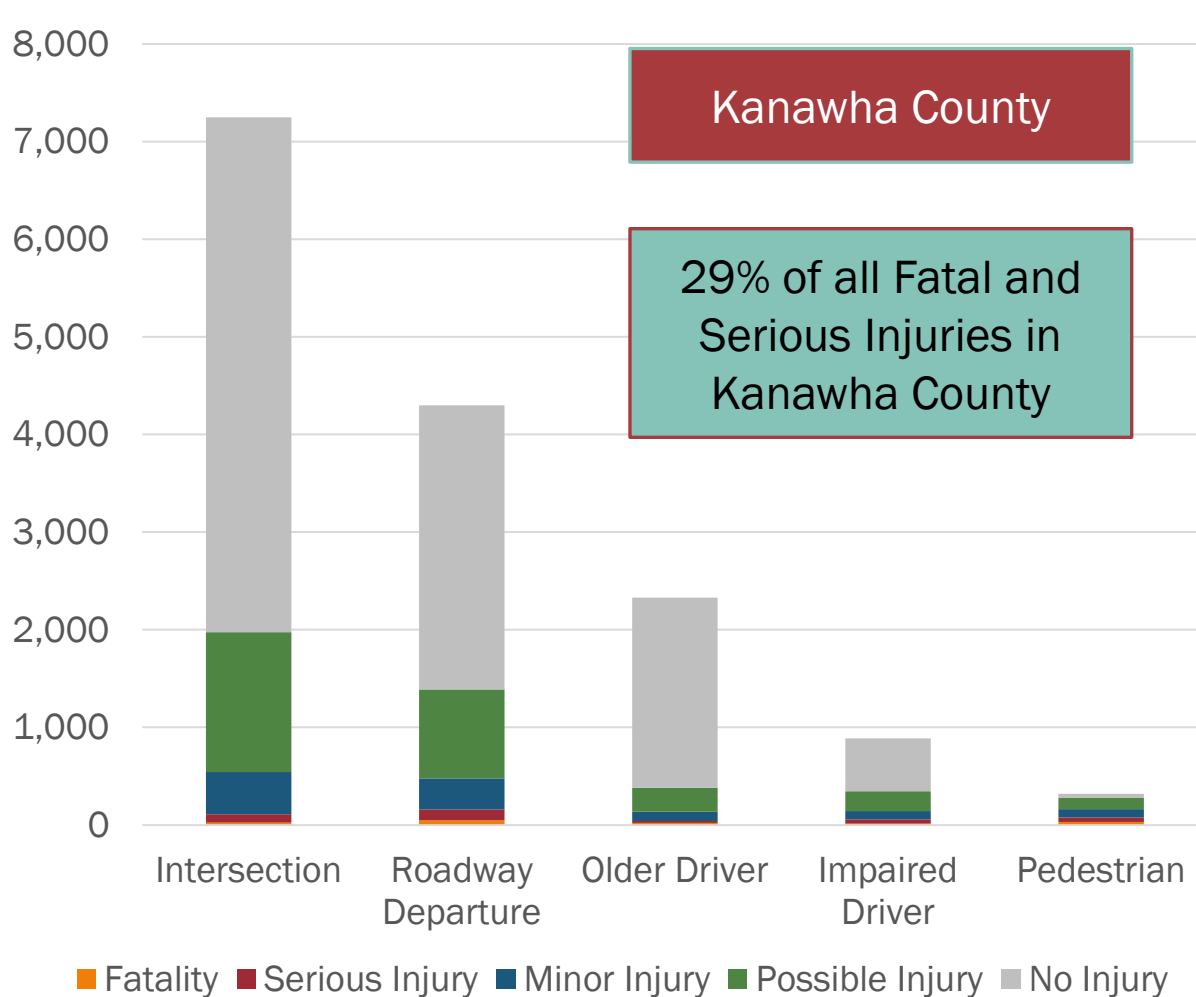
Intersections	2017-2021 SHSP '06-'15 Crashes	2022-2026 SHSP '16-'20 Crashes	Trend
% of total Fatalities	10%	14%	▲
% of total Serious Injuries	18%	19%	▲

% of Total Intersection Fatalities & Serious Injuries

- | | |
|-------------------------|------------------------|
| 1 Kanawha County 12% | 4 Wood County 6% |
| 2 Cabell County 9% | 5 Berkeley County 6% |
| 3 Jefferson County 7% | 6 Raleigh County 5% |



Intersections as an Emphasis Area



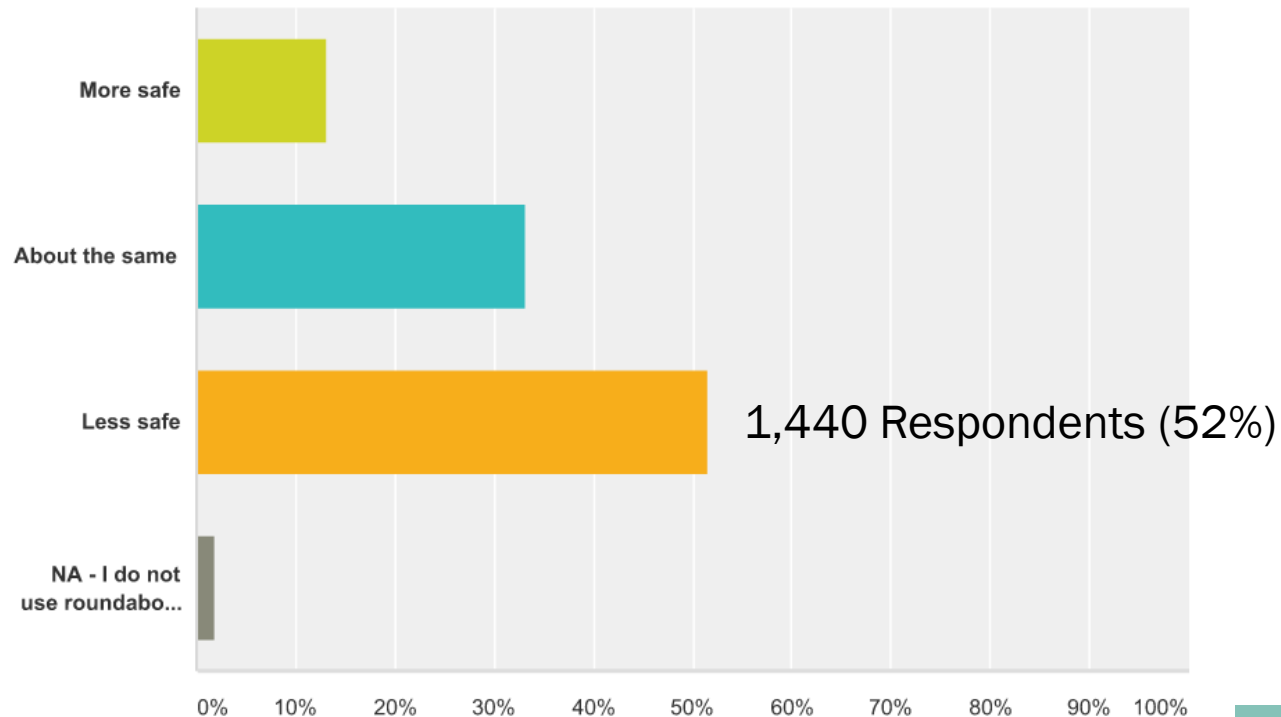


Roundabout Myth Busters

Myth: Roundabouts Are Not Safe!

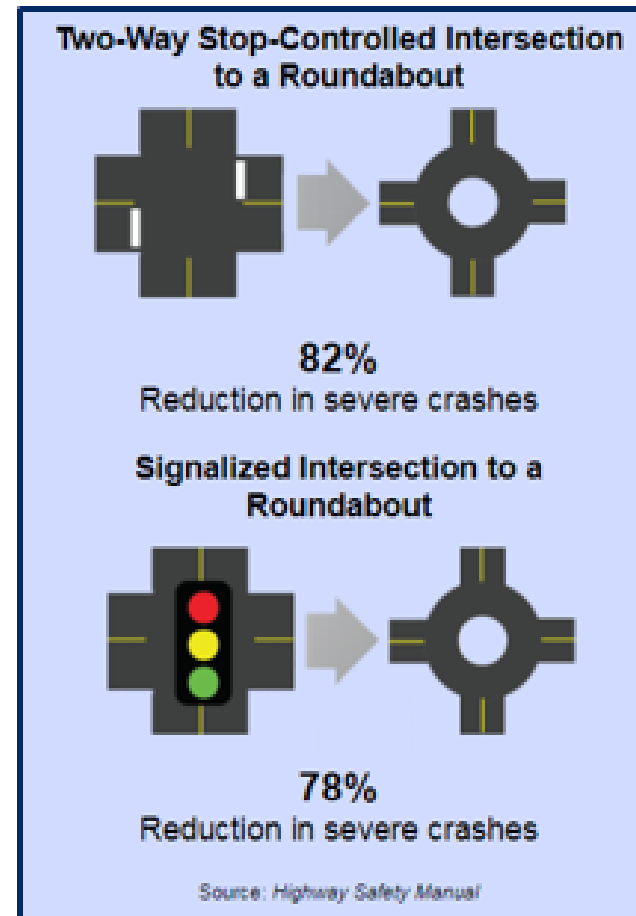
Q7 As a motorist, how safe do you feel in a roundabout compared to an intersection with traffic signals?

Answered: 2,790 Skipped: 217



What does the data show?

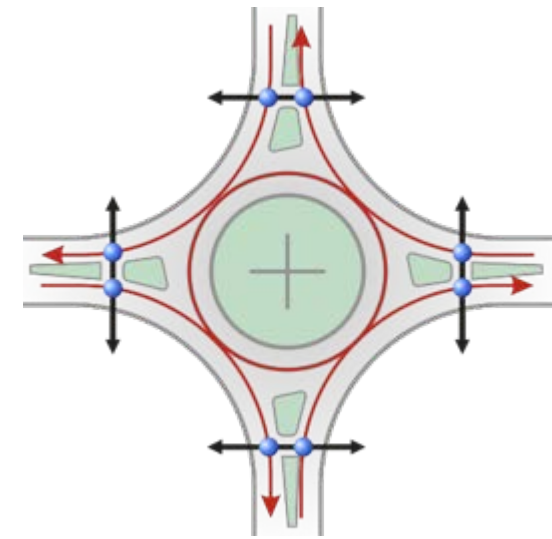
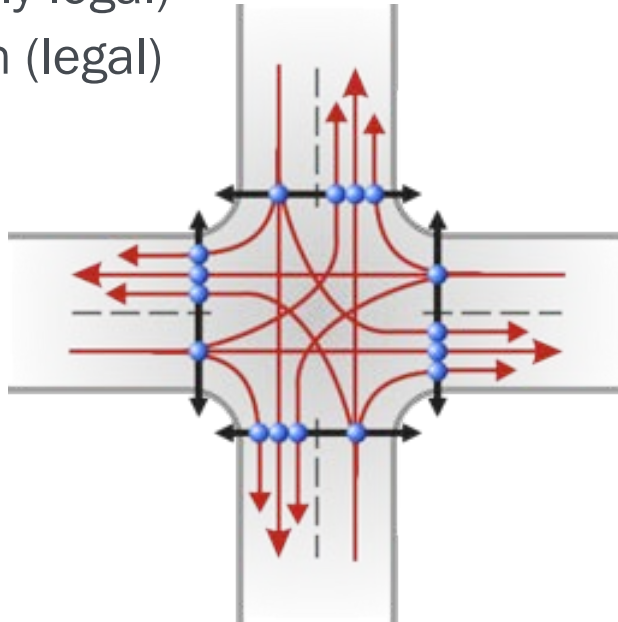
Area Type/Severity	Crash Reduction
All/Injury	32%
Urban/Injury	60%
Suburban/All	67%
All/All	48%
All/Injury	88%
Suburban/All	21%
Urban-Suburban/All	66%
Suburban/All	42%
Suburban/Injury	74%



Why is it Safer? – Conflict Points

At Signalized Intersection (32):

- Crossing movements on red (high-speed, illegal)
- Left on green (legal for permitted phasing)
- Right on red (typically legal)
- Right turns on green (legal)

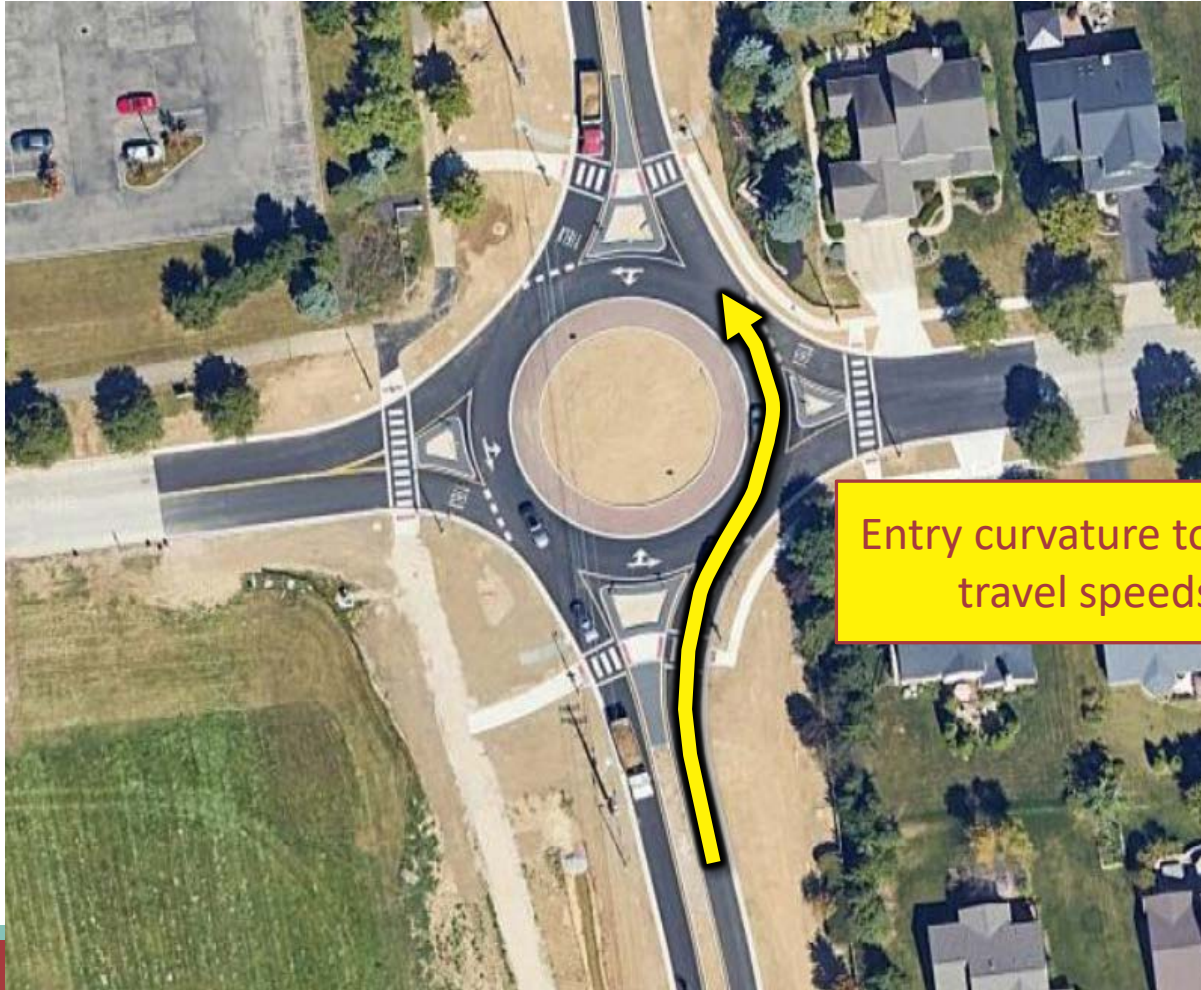


At Roundabout (8):

- Conflict with entering vehicles
- Conflict with exiting vehicles



Why is it Safer? – Speed Reduction



Entry curvature to slow travel speeds



Why is it Safer? – Pedestrians



Source: <http://www.pedbikesafe.org>



Source: Google Maps



Note about Multi-Lane Roundabouts

- Total crashes tend to increase at 2x2 roundabouts
- Injury and fatal crashes are significantly decreased
- Driver confusion with multiple lanes typically cause the increase in crashes



Can still be installed with care and careful consideration!



Myth: Roundabouts are Expensive!



Short Answer... It Depends



*When also constructing turn lanes or other intersection modifications

Source: Jacksonville.com

From Washington DOT:
The cost difference between building a roundabout and building a traffic signal is pretty comparable*. Where long-term costs are considered, roundabouts eliminate hardware, maintenance, and electrical costs associated with traffic signals, which can cost between \$5,000 and \$10,000 per year.



But... the Benefits can Outweigh Costs

Int.	Roundabout Type	Cost	Benefit/Cost Ratio	20-Year Injury Crash Reduction*
A	4-legged multi-lane	\$1,447,553	6.53	43.35
B	4-legged single lane	\$1,664,480	1.28	8.66
C	3-legged single lane	\$1,335,579	0.83	4.51
D	4-legged multi-lane	\$2,496,487	1.63	22.28
E	3-legged mini	\$419,407	0.36	0.65

*(Over Conventional Intersection)

Source: Roundabout Safety Benefit-Cost Analysis in Nevada (2020)



Myth: Trucks Don't Fit!



Source: Fox59.com

Trucks Can be Accommodated!



Source: Michigan.gov

A Large Truck
is expected
TO DRIVE OVER THE
TRUCK
APRON
in Roundabouts



Source: Pennsylvania DOT



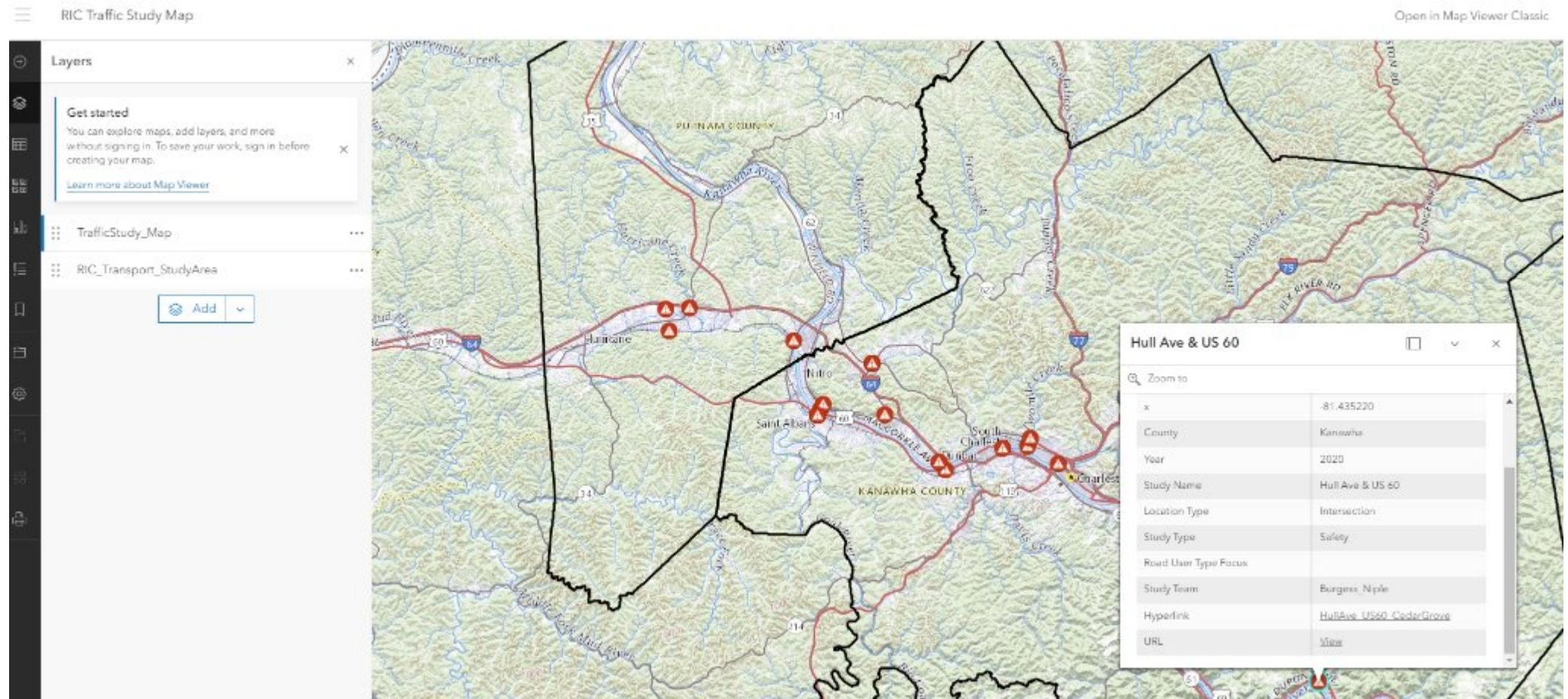
Don't Just Take Our Word For It!





Overview of RIC Studies

Overview of RIC Studies



RIC Studies Library

Name	Modified	Modified By	File size	Sharing
3rdunderpass2012.pdf	November 3, 2023	Sam Richardson	33.3 MB	Shared
3rdunderpass2016.pdf	November 3, 2023	Sam Richardson	33.1 MB	Shared
campbells.pdf	November 3, 2023	Sam Richardson	11.3 MB	Shared
centerbridge.pdf	November 3, 2023	Sam Richardson	368 KB	Shared
cross1997.pdf	November 3, 2023	Sam Richardson	160 KB	Shared
cross2016.pdf	November 3, 2023	Sam Richardson	21.9 MB	Shared
dunbar10th.pdf	November 3, 2023	Sam Richardson	6.19 MB	Shared
hull_milebranch.pdf	November 3, 2023	Sam Richardson	15.7 MB	Shared
montrose.pdf	November 3, 2023	Sam Richardson	39.5 MB	Shared
nitro1st.pdf	November 3, 2023	Sam Richardson	20.4 MB	Shared
patrick.pdf	November 3, 2023	Sam Richardson	19.8 MB	Shared
pennave.pdf	November 3, 2023	Sam Richardson	20.3 MB	Shared
springhill.pdf	November 3, 2023	Sam Richardson	3.73 MB	Shared
teays.pdf	November 3, 2023	Sam Richardson	21.8 MB	Shared
us119n.pdf	November 3, 2023	Sam Richardson	29.2 KB	Shared
vernon.pdf	November 3, 2023	Sam Richardson	17.1 MB	Shared
washwrebecca.pdf	November 3, 2023	Sam Richardson	20.2 MB	Shared
wv25_62.pdf	November 3, 2023	Sam Richardson	94.7 KB	Shared
wv34.pdf	November 3, 2023	Sam Richardson	15.1 MB	Shared
wv817teays.pdf	November 3, 2023	Sam Richardson	12.9 MB	Shared



How are Traffic Studies Funded?

- A Consolidated Planning Grant (CPG) through consolidated FHWA PL funds and FTA MPP funds.
 - Funds available to MPOs in an urbanized area with a population of 50,000 or more
 - RIC and WVDOT provide a local match at the rate of 10% each
 - This information is available for public review in the RIC UPWP





Roundabouts in West Virginia

Existing Roundabouts Statewide - Williamstown



Existing Roundabouts Statewide - Fairmont



Roundabout Operation
Jefferson Road SOUTH to Kanawha Turnpike EAST





RIC Studies with Roundabouts

RIC Studies With Roundabouts

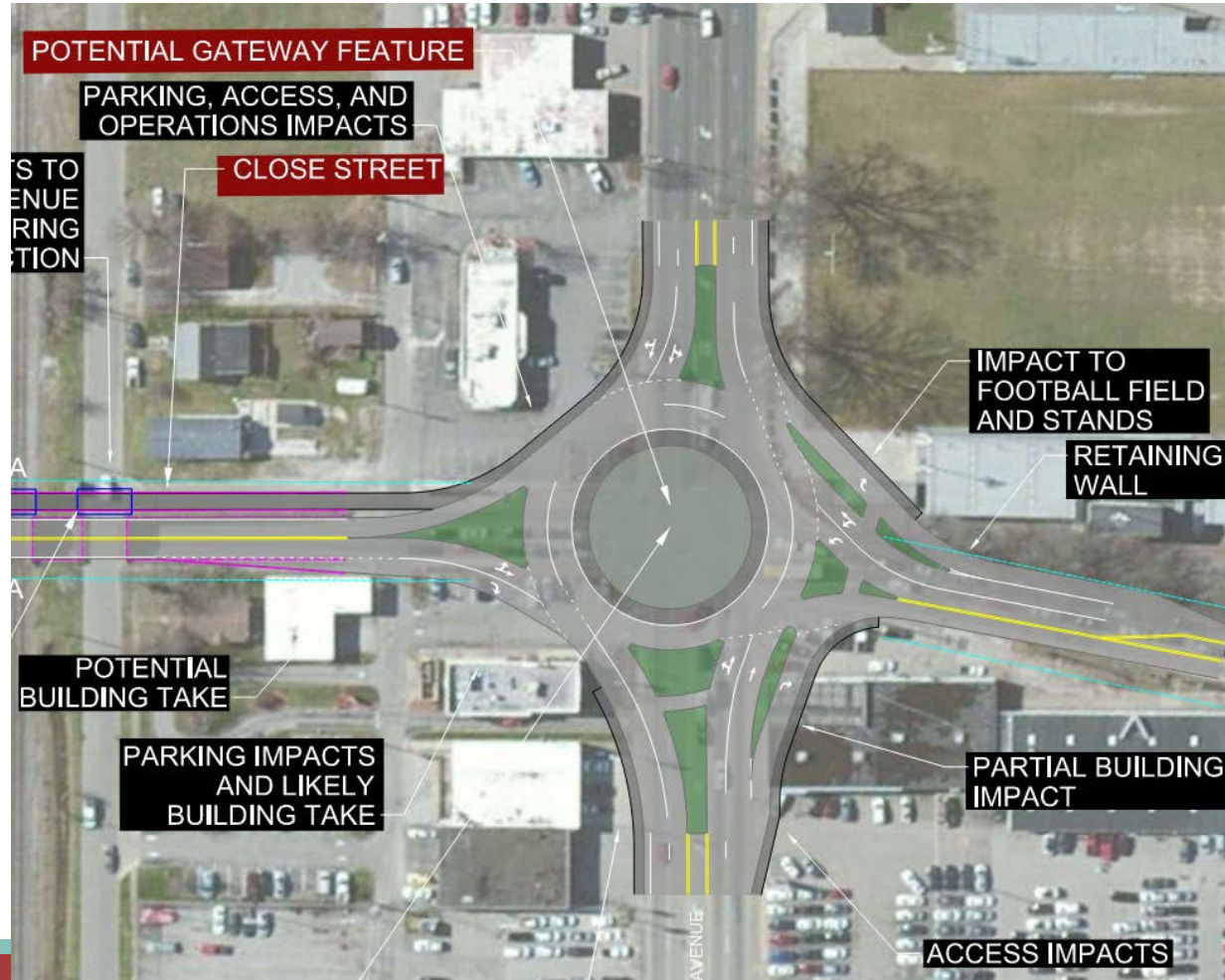
- St. Albans 3rd Street Corridor – 2016
- Cross Lanes Goff Mountain Road and Big Tyler Road (WV 622) Corridor – 2016
- 1st Avenue and Center Street – 2022
- WV 817 and Teays Valley Road - 2022



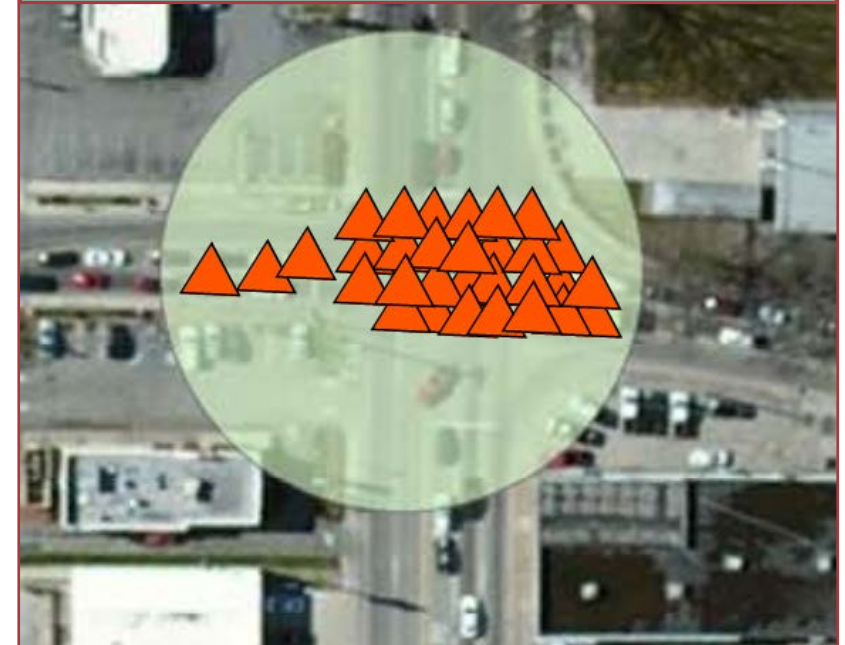
St. Albans 3rd Street Corridor (2016)



St. Albans 3rd Street Corridor (2016)



MacCorkle Avenue and Third Street Crashes

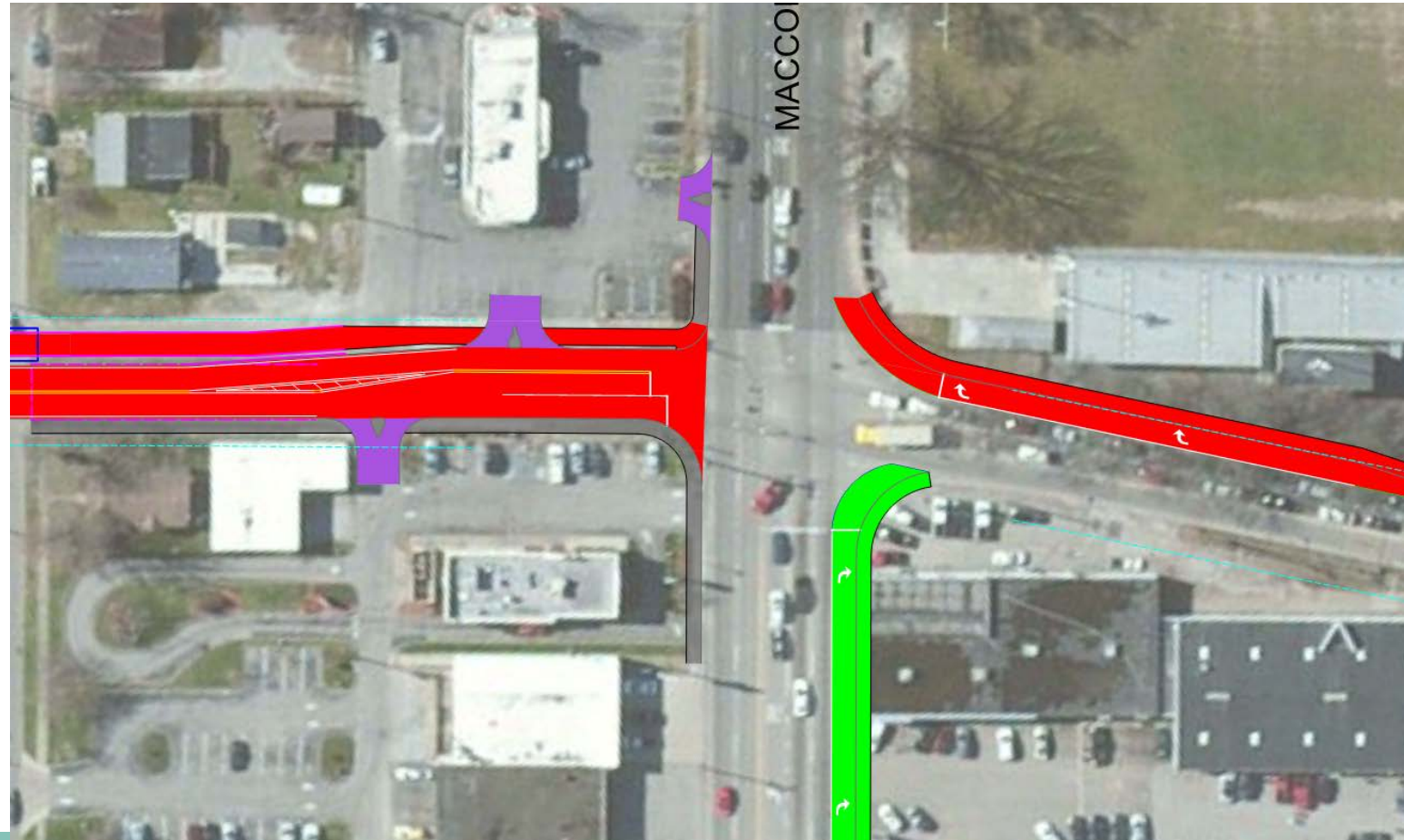


31 Total Crashes
4 injury, 19 rear end, 12 sideswipe

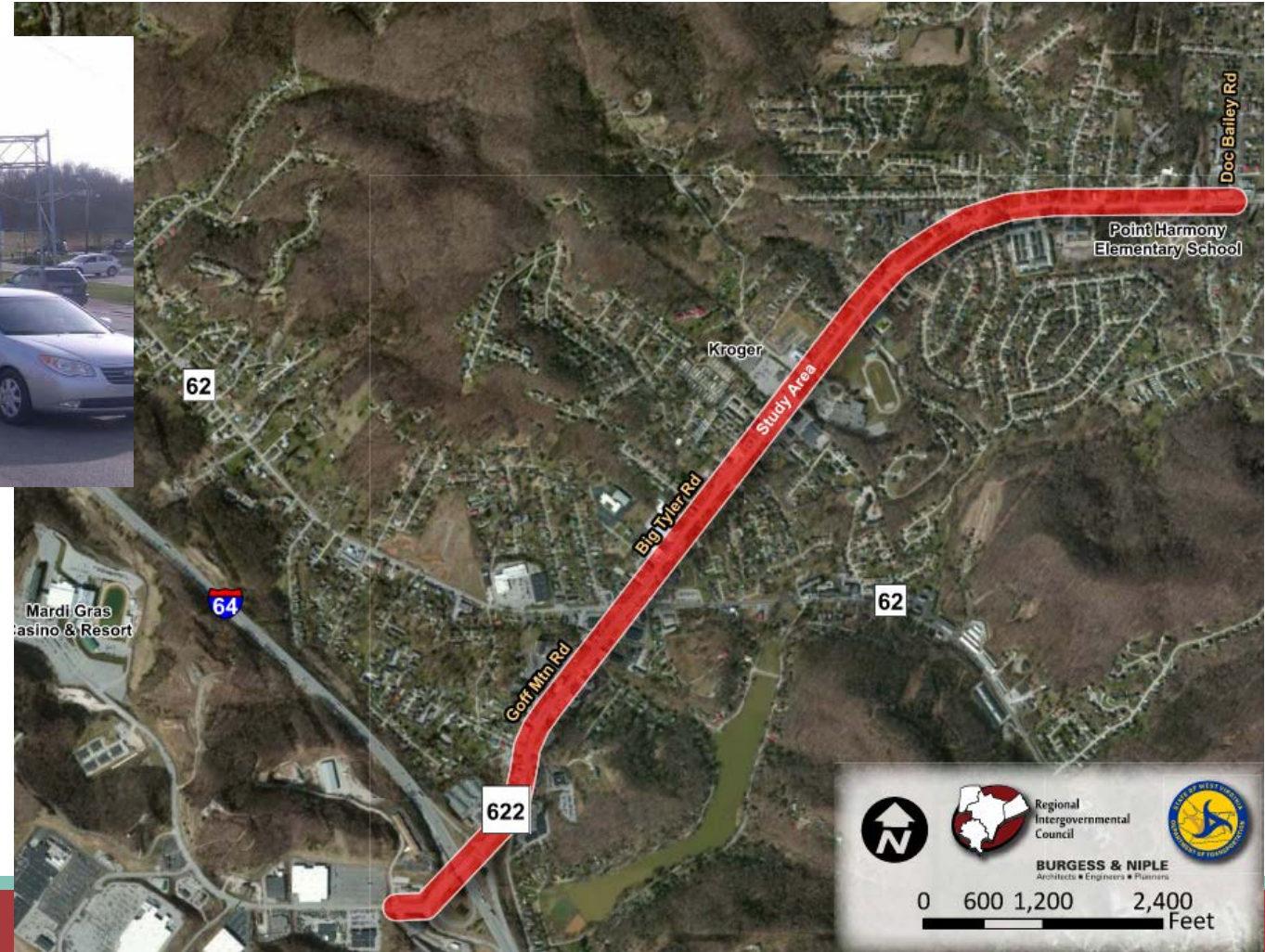


St. Albans 3rd Street Corridor (2016)

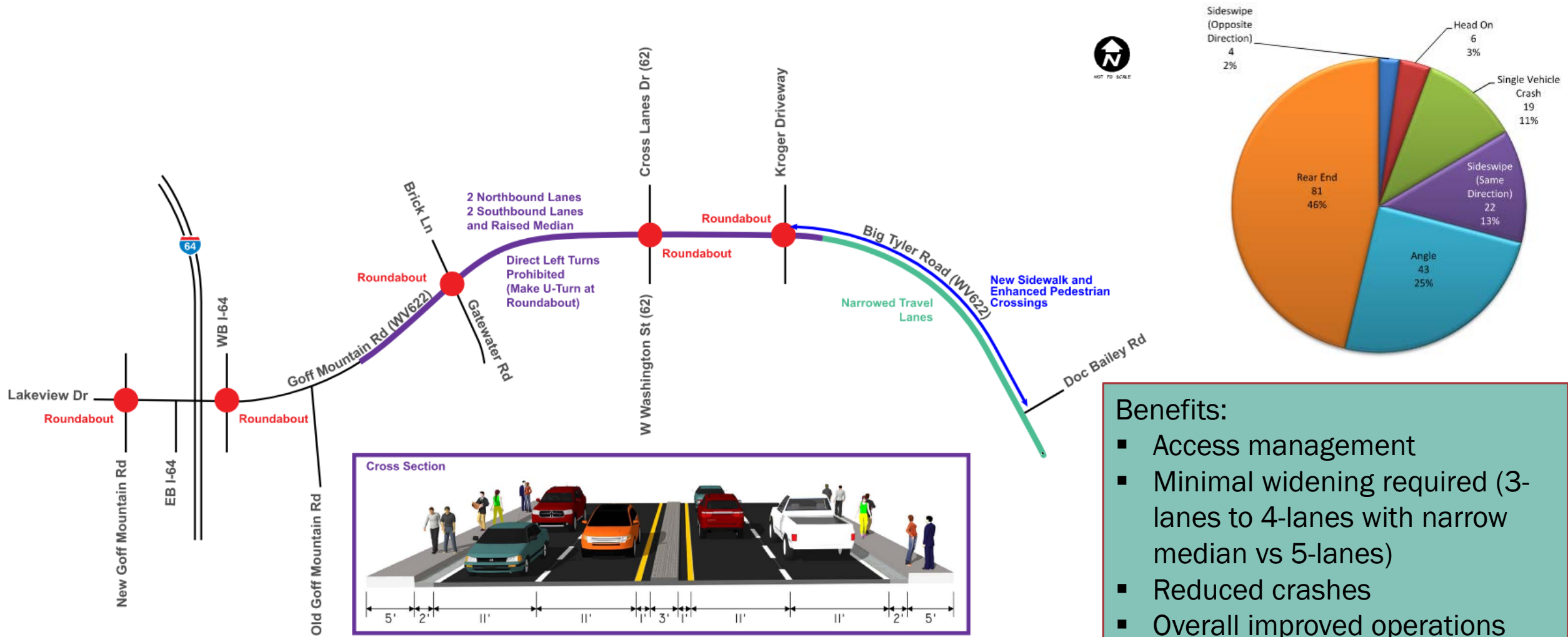
- Results
 - Recommendation: construct turn lanes, maintain signal
 - Costs (significant property impacts, 2x2) outweighed benefits (gateway treatment, improved operations)



Cross Lanes Goff Mountain and Big Tyler Road (WV 622) (2016)



Cross Lanes Goff Mountain and Big Tyler Road (WV 622) (2016)



Benefits:

- Access management
- Minimal widening required (3-lanes to 4-lanes with narrow median vs 5-lanes)
- Reduced crashes
- Overall improved operations

Cross Lanes Goff Mountain and Big Tyler Road (WV 622) (2016)

Concerns about Roundabout Corridor:

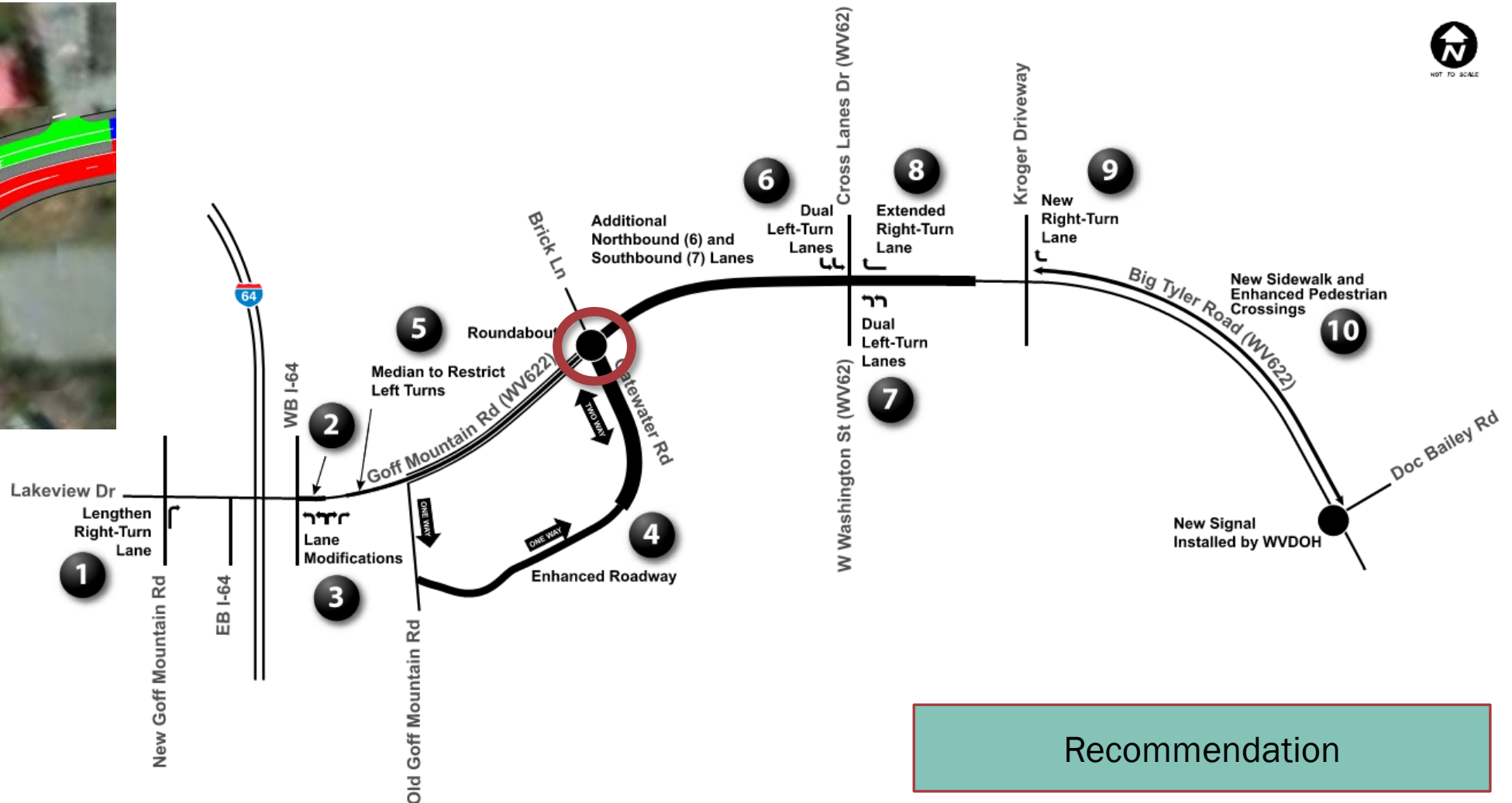
- Driver confusion
- Land use impacts
- Costs (over \$3M more than any other alternative)

Table 9-8: Comment Responses – Disliked Features of Scenario C

Feature	Number of Respondents
Confusion Associated with Roundabouts	14
Inconvenience of Roundabouts (No Left-Turns Along Corridor)	7
Roundabouts (No Specific Location Identified)	6
Too Many Roundabouts	6
Construction Costs	3
"Everything"	2
Roundabout at New Goff Mountain Road	1
Roundabout at I-64 WB Ramp	1
Roundabout at Brick Lane	1
Sidewalk Additions North of Kroger	1
No Improvements to Sun Valley Drive	1
Removing Crosswalks	1
Improvement not Making a Large Enough Impact in Congestion	1
Closure of Access to Cross Lanes Bible Church	1
No Improvements to Brick Lane	1
Building Impacts at New Goff Mountain Road	1
"Nothing"	1



Cross Lanes Goff Mountain and Big Tyler Road (WV 622) (2016)



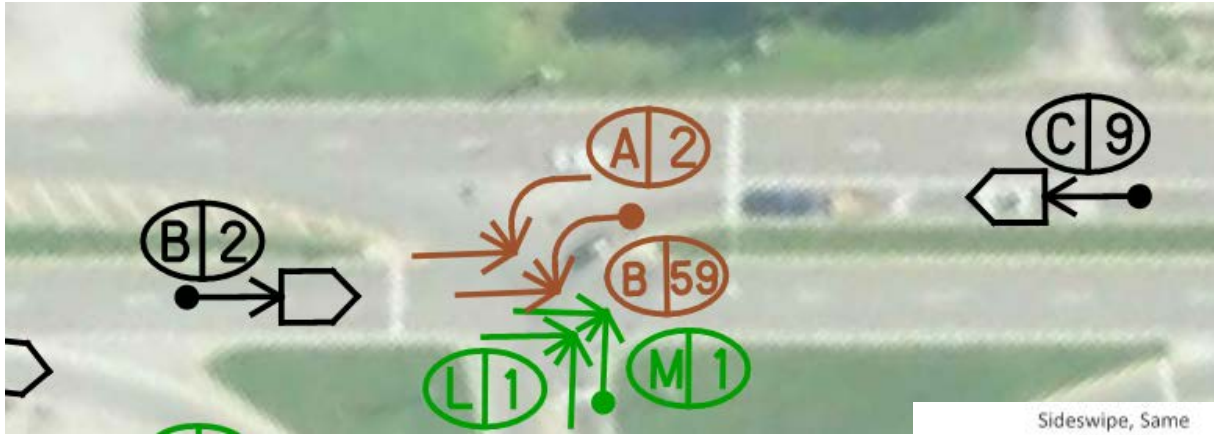
Recommendation

Cross Lanes Goff Mountain and Big Tyler Road (WV 622) (2016)

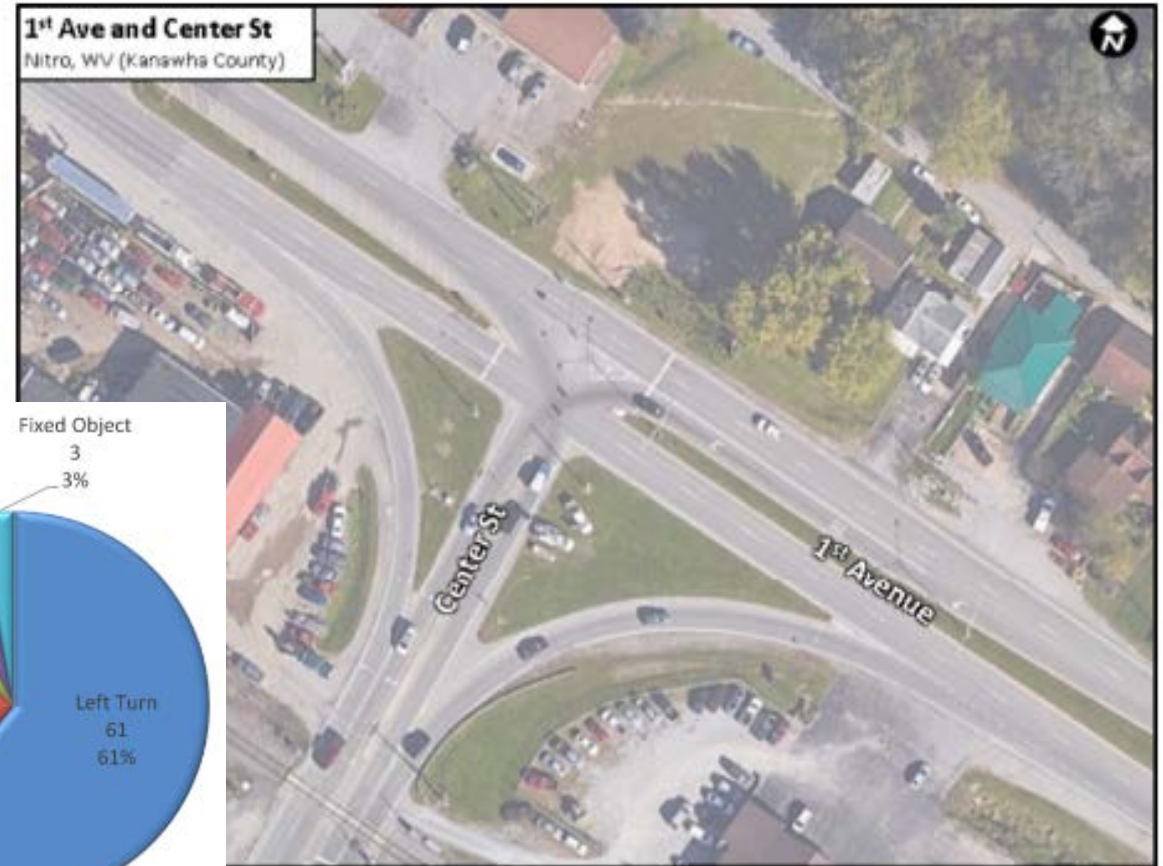
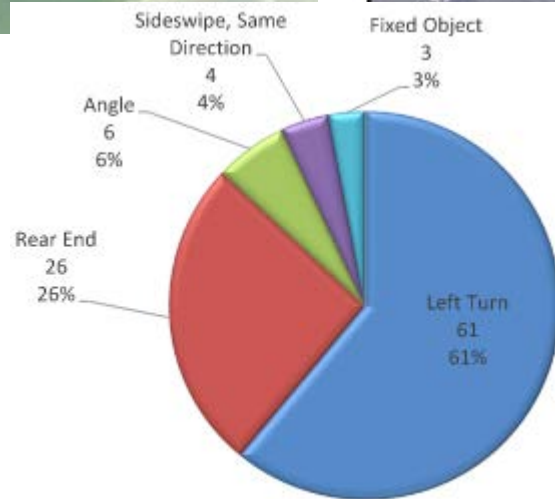
But...



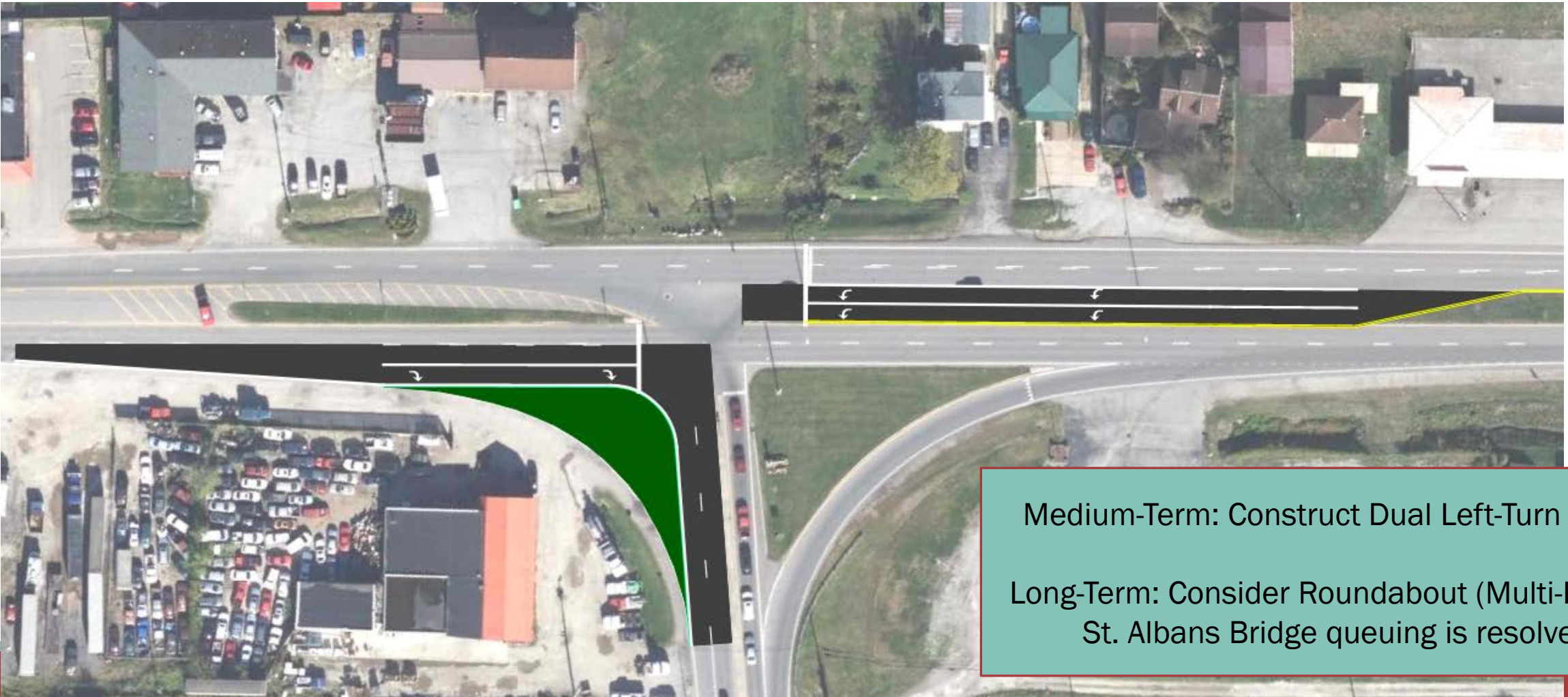
1st Avenue and Center Street (2022)



28 of 61 Left-Turn Crashes
Resulted in Injury (46%)



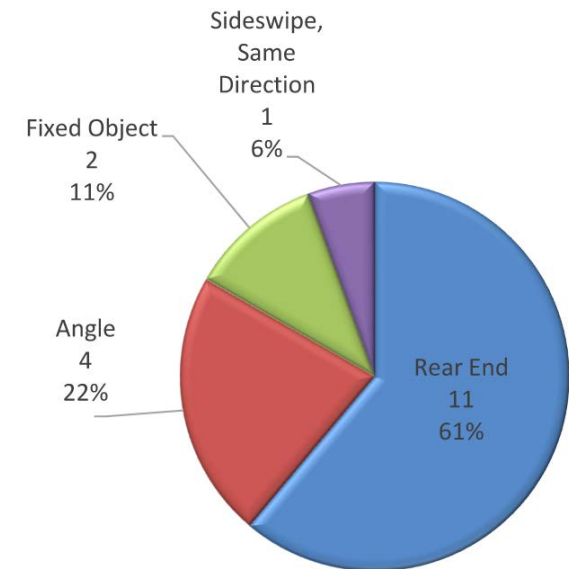
1st Avenue and Center Street (2022)



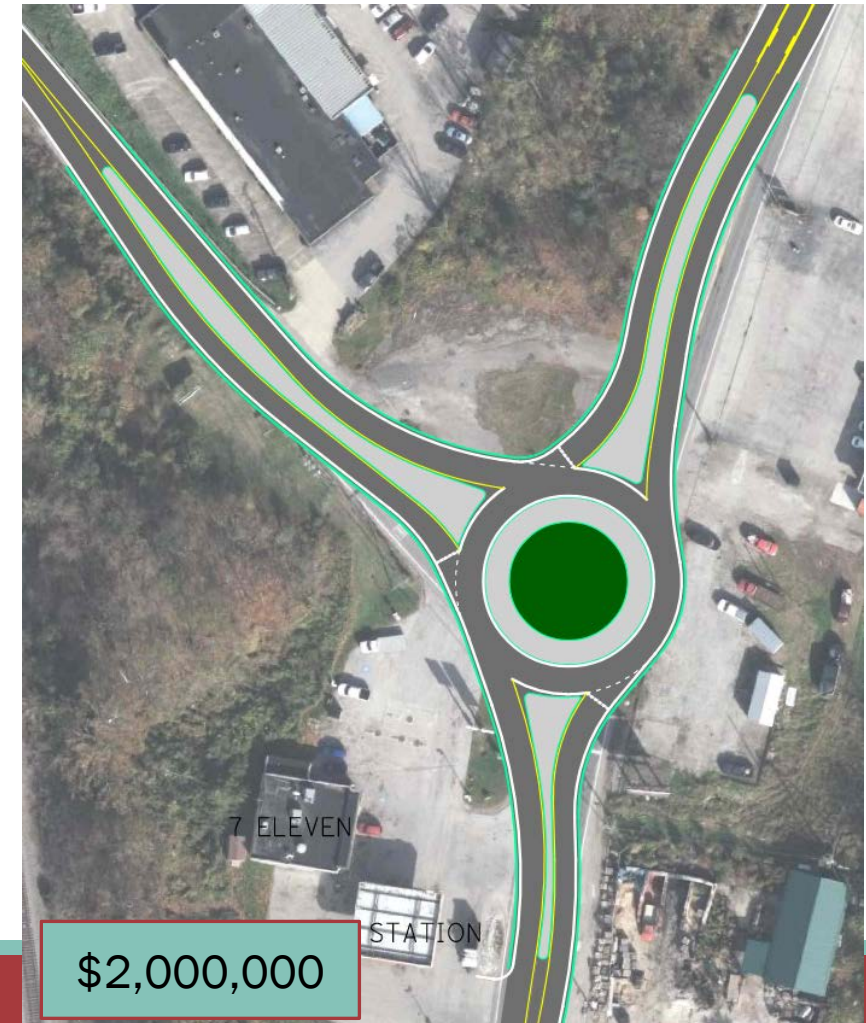
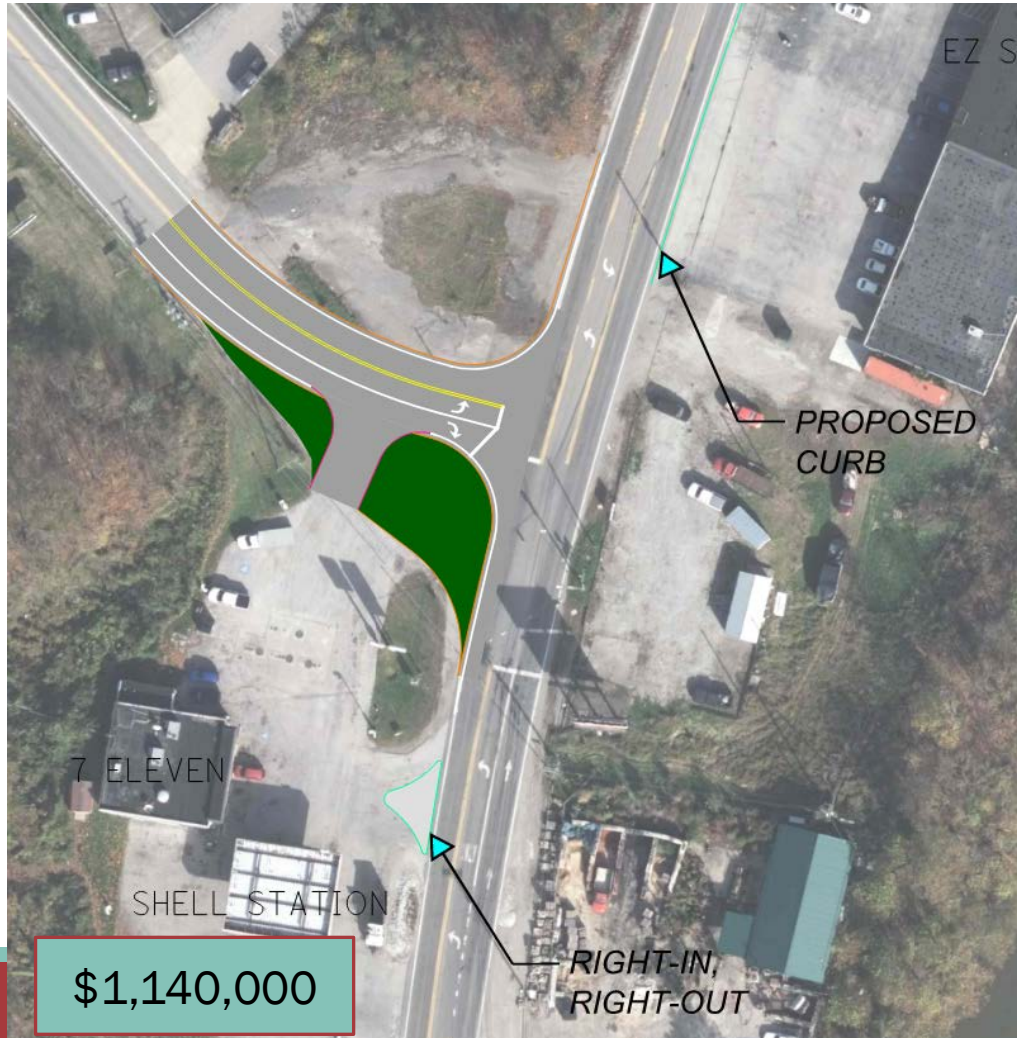
Medium-Term: Construct Dual Left-Turn Lanes

Long-Term: Consider Roundabout (Multi-Lane) if
St. Albans Bridge queuing is resolved

WV 817 and Teays Valley Road (2022)



WV 817 and Teays Valley Road (2022)



WV 817 and Teays Valley Road (2022)

Table 4: Proposed Roundabout HSM Analysis Results

	Fatal and Injury Crashes	Property Damage Only Crashes	Total
N _{predicted} - Existing	0.63	1.06	1.70
N _{predicted} - Proposed	0.22	0.71	0.93
Crash Reduction	0.41	0.35	0.77

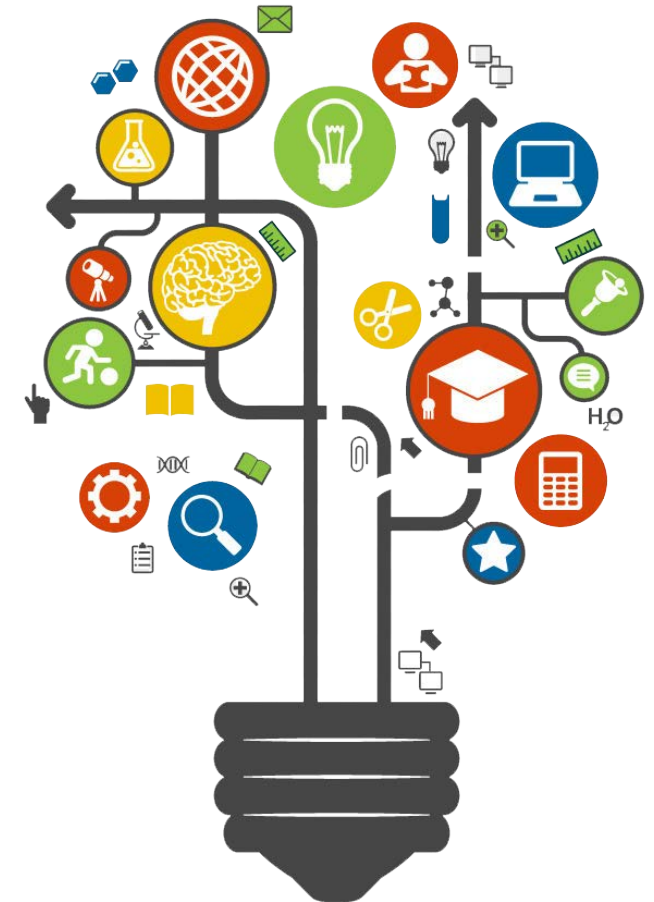
Table 6: Benefit/Cost Summary

	Safety Benefit	Cost Estimate (2022 dollars)	Benefit/Cost Ratio
Roundabout	\$2,713,000	\$ 1,680,000	1.61



Lessons Learned from RIC Studies

- Don't force a roundabout
- If a roundabout is desired, plan ahead!
- Consider adjacent intersections
- Public acceptance will take time





Roundabout Funding

Roundabout Funding

- Discretionary Grants
 - Safe Streets and Roads for All (SS4A)
 - Rebuilding America's Infrastructure for Sustainability and Equity (RAISE)
- Formula Funding
 - Surface Transportation Block Grant (STBG)
 - Up to 100% Federal Share
 - Carbon Reduction Program (CRP)
 - Up to 100% Federal Share
 - Highway Safety Improvement Program (HSIP)
 - Congestion Mitigation and Air Quality (CMAQ)





Next Steps

Next Steps

- Systemwide roundabout and traffic circle feasibility plan
- Geographic and property context
 - Street and Intersection Grade
 - Adjacent property feasibility issues
 - Minimum parking requirements
 - High value commercial, retail, or corporate property
 - Environmental Justice
 - DBEs, historic districts and properties, equity considerations
 - Interchanges
 - Flood zones



Questions



Sam Richardson
SRichardson@wvregion3.org

Kendra Schenk, PE, PTOE, RSP₂₁
Kendra.Schenk@burgessniple.com

